

REMARKS

Applicant requests favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

Claims 19-25 are presented for consideration. Claims 19, 22, 23 and 25 are independent. Claim 19, 22, 23 and 25 have been amended to clarify features of the subject invention. Support for these changes can be found in the original application, as filed. Therefore, no new matter has been added.

Applicant requests favorable reconsideration and withdrawal of the rejection set forth in the above-noted Office Action.

Claims 19-25 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 5,841,520 to Taniguchi. Applicant submits that the cited art does not teach or suggest many features of the present invention, as previously recited in these claims. Therefore, these rejections are respectfully traversed. Nevertheless, Applicant submits that independent claims 19, 22, 23 and 25, as presented, amplify the distinctions between the present invention and the cited art.

In one aspect of the present invention, independent claim 19 recites a scan type exposure apparatus including a first stage on which a first object is placed, a second stage on which a second object is placed, a projection optical system for projecting a pattern of the first object onto the second object, a scanning mechanism arranged to scanningly move the first and second stages in a timed relation with each other, relative to the projection optical system, while the pattern of the first object is projected by the projection optical system onto the second object, and a signal system systemized to store data corresponding to a change in an exposure condition. The change

in the exposure condition is produced in response to scan motion of at least one of the first and second stages and in accordance with one of scan acceleration and scan speed. The data is measured beforehand by obtaining data of a projected image of the pattern of the first object, being formed on the second object through the projection optical system, while scanningly moving at least one of the first and second stages. The signal system is further systemized to increase and decrease the scan speed of at least one of the first and second stages in an actual exposure process so as to compensate for a change in the exposure condition, while reflecting a correction value, as determined on the basis of the data stored, to the scan speed of at least one of the first and second stages.

In another aspect of the present invention, independent claim 22 recites a device manufacturing method including a pattern exposure step for performing exposure by use of a scan type exposure apparatus including (i) a first stage on which a first object is placed, (ii) a second stage on which a second object is placed, (iii) a projection optical system for projecting a pattern of the first object onto the second object, (iv) a scanning mechanism arranged to scanningly move the first and second stages in a timed relation with each other, relative to the projection optical system, while the pattern of the first object is projected by the projection optical system onto the second object, and (v) a signal system systemized to store data corresponding to a change in an exposure condition. The change in the exposure condition is produced in response to scan motion of at least one of the first and second stages and in accordance with one of scan acceleration and scan speed. The data is measured beforehand by obtaining data of a projected image of the pattern of the first object, being formed on the second object through the projection optical system, while scanningly moving at least one of the first and

second stages. The signal system is further systemized to increase and decrease the scan speed of at least one of the first and second stages in an actual exposure process so as to compensate for a change in the exposure condition, while reflecting a correction value, as determined on the basis of the data stored, to the scan speed of at least one of the first and second stages. The method further includes a development step for developing the second object pattern exposed by the scan type exposure apparatus, in which a circuit pattern can be formed on the basis of the developed exposed pattern.

In a further aspect of the present invention, independent claim 23 recites a scan type exposure apparatus including a first stage on which a first object is placed, a second stage on which a second object is placed, a projection optical system for projecting a pattern of the first object onto the second object, a scanning mechanism arranged to scan the first and second stages in a timed relation with each other, relative to the projection optical system, while the pattern of the first object is projected by the projection optical system onto the second object, a storing device for storing data related to a shift in a projected image due to vibration of the projection optical system, and a drive control device for increasing and decreasing a scan speed of at least one of the first and second stages so as to compensate for a change in the exposure condition, on the basis of the stored data.

In still another aspect of the present invention, independent claim 25 recites a scan type exposure apparatus, including a first stage on which a first object is placed, a second stage on which a second object is placed, a projection optical system for projecting a pattern of the first object onto the second object, a scanning mechanism arranged to scan the first and second stages in a timed relation with each other, relative to the projection optical system, while

the pattern of the first object is projected by the projection optical system onto the second object, and a signal system systemized to store data corresponding to a change in an exposure condition. The change in the exposure condition is produced in response to scan motion of at least one of the first and second stages and in accordance with one of scan acceleration and scan speed. The data is measured beforehand by obtaining data of a projected image of the pattern of the first object, being formed on the second object through the projection optical system, while scanningly moving at least one of the first and second stages. The signal system is further systemized to increase and decrease the scan speed of at least one of the first and second stages in an actual exposure process, while reflecting a corrective value, as determined on the basis of the data stored with respect to deviation of the projected image of the pattern of the first object upon the second object, to the scan speed of at least one of said first and second stages.

By such an arrangement, in the present invention, the scan speed of at least one of the first and second stages can be increased and decreased so as to compensate for a change in an exposure condition. In this manner, an exposure apparatus, for example, can perform compensation of a change in an exposure condition resulting from a scan operation, without significantly lowering the throughput of the apparatus.

Applicant submits that the cited art does not teach or suggest such features of the present invention as recited in independent claims 19, 22, 23 and 25.

The Taniguchi patent relates to a scanning type exposure apparatus that has a mask stage for scanning a mask across an illumination area on the mask, a projection optical system for projecting an image of a pattern on the mask onto a photosensitive substrate, and a substrate stage for scanning the photosensitive substrate across an exposure area. An image pickup unit,

having its light-receiving section provided on the substrate stage, photoelectrically detects an image of a mark pattern on the mask, and a combining unit combines signals output from the image pickup unit during a period in which the light-receiving section is scanned across the exposure area in synchronization with scanning for the mark pattern across the illumination area. Image formation characteristics or a position of the image of the mark pattern is determined on the basis of an output of the combining unit, which may be corrected before actual exposure. Correction is also performed by using synchronization errors or by using an edge scan type sensor in place of the image pickup unit.

In the Taniguchi patent, a change in an imaging characteristic caused by vibration of the exposure apparatus is corrected by lowering the scan speed. Specifically, in that patent, the correction is carried out only by decreasing the scan speed. Applicant submits, therefore, that the Taniguchi patent does not teach or suggest anything regarding increasing and decreasing a scan speed in order to perform a correction in the manner of the present invention recited in independent claims 19, 22, 23 and 25.

For the foregoing reasons, Applicant submits that the present invention, as recited in independent claims 19, 22, 23 and 25, is patentably defined over the cited art.

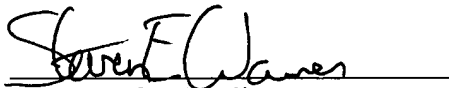
Dependent claims 20, 21 and 24 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.

Applicant further submits that the instant application is in condition for allowance.

Favorable reconsideration, withdrawal of the rejection set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Steven E. Warner", is written over a horizontal line.

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